

HAWAII ADMINISTRATIVE RULES

TITLE 12

DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

SUBTITLE 8

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

PART 3

CONSTRUCTION STANDARDS

CHAPTER 147

CADMIUM

§12-147-1 Incorporation of federal standard

§12-147-2 Definitions

§12-147-1 Incorporation of federal standard. Title 29, Code of Federal Regulations, section 1926.63, entitled "Cadmium", published by the Office of the Federal Register, National Archives and Records Administration, on September 14, 1992, and the amendments published on April 23, 1993; January 3, 1994 (redesignated as section 1926.1127); June 20, 1996; January 8, 1998; and January 5, 2005, are made a part of this chapter, except as provided in section 12-147-2. [Eff 2/26/93; am 11/5/93; am 7/25/94; am 8/10/95; am 11/16/96; am 7/6/98; am 3/31/06] (Auth: HRS §396-4) (Imp: HRS §396-4)

§1926.1127 Cadmium

(a) Scope. This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, in all construction work where an employee may potentially be exposed to cadmium. Construction work is defined as work involving construction, alteration and/or repair, including but not limited to the following:

- (1) Wrecking, demolition or salvage of structures where cadmium or materials containing cadmium are present;
- (2) Use of cadmium containing-paints and cutting, brazing, burning, grinding or welding on surfaces that were painted with cadmium-containing paints;
- (3) Construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain cadmium, or materials containing cadmium;
- (4) Cadmium welding; cutting and welding cadmium-plated steel; brazing or welding with cadmium alloys;
- (5) Installation of products containing cadmium;
- (6) Electrical grounding with cadmium welding, or electrical work using cadmium-coated conduit;
- (7) Maintaining or retrofitting cadmium-coated equipment;
- (8) Cadmium contamination/emergency cleanup; and
- (9) Transportation, disposal, storage, or containment of cadmium or materials containing

cadmium on the site or location at which construction activities are performed.

(b) Definitions.

Action level (AL) is defined as an airborne concentration of cadmium of 2.5 micrograms per cubic meter of air ($2.5 \mu\text{g}/\text{m}^3$), calculated as an 8-hour time-weighted average (TWA).

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Authorized person means any person authorized by the employer and required by work duties to be present in regulated areas or any person authorized by the OSH Act or regulations issued under it to be in regulated areas.

Competent person, in accordance with 29 CFR 1926.32(f), means a person designated by the employer to act on the employer's behalf who is capable of identifying existing and potential cadmium hazards in the workplace and the proper methods to control them in order to protect workers, and has the authority necessary to take prompt corrective measures to eliminate or control such hazards. The duties of a competent person include at least the following: Determining prior to the performance of work whether cadmium is present in the workplace; establishing, where necessary, regulated areas and assuring that access to and from those areas is limited to authorized employees; assuring the adequacy of any employee exposure monitoring required by this standard; assuring that all employees exposed to air cadmium levels above the PEL wear appropriate personal protective equipment and are trained in the use of appropriate methods of exposure control; assuring that proper hygiene facilities are provided and that workers are trained to use those facilities; and assuring that the engineering controls required by this standard are implemented, maintained in proper operating condition, and functioning properly.

Director means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

Employee exposure and protective equipment.

Final medical determination is the written medical opinion of the employee's health status by the examining physician under paragraphs (l)(3)-(12) of this section or, if multiple physician review under paragraph (l)(13) of this section or the alternative physician determination under paragraph (l)(14) of this section is invoked, it is the final, written medical finding, recommendation or determination that emerges from that process.

High-efficiency Particulate Air [HEPA] filter means a filter capable of trapping and retaining at least 99.97 percent of mono-dispersed particles of 0.3 micrometers in diameter.

Regulated area means an area demarcated by the employer where an employee's exposure to airborne concentrations of cadmium exceeds, or can reasonably be expected to exceed the permissible exposure limit (PEL).

This section means this cadmium standard.

(c) Permissible Exposure Limit (PEL). The employer shall assure that no employee is exposed to an airborne concentration of cadmium in excess of five micrograms per cubic meter of air ($5 \mu\text{g}/\text{m}^3$), calculated as an eight-hour time-weighted average exposure (TWA).

(d) Exposure Monitoring.

(1) General.

- (i) Prior to the performance of any construction work where employees may be potentially exposed to cadmium, the employer shall establish the applicability of this standard by determining whether cadmium is present in the workplace and whether there is the possibility that employee exposures will be at or above the action level. The employer shall designate a competent person who shall make this determination. Investigation and material testing techniques shall be used, as appropriate, in the determination. Investigation shall include a review of relevant plans, past reports, material safety data sheets, and other available records, and consultations with the property owner and discussions with appropriate individuals and agencies.

- (ii) Where cadmium has been determined to be present in the workplace, and it has been determined that there is a possibility the employee's exposure will be at or above the action level, the competent person shall identify employees potentially exposed to cadmium at or above the action level.
 - (iii) Determinations of employee exposure shall be made from breathing-zone air samples that reflect the monitored employee's regular, daily 8-hour TWA exposure to cadmium.
 - (iv) Eight-hour TWA exposures shall be determined for each employee on the basis of one or more personal breathing-zone air samples reflecting full shift exposure on each shift, for each job classification, in each work area. Where several employees perform the same job tasks, in the same job classification, on the same shift, in the same work area, and the length, duration, and level of cadmium exposures are similar, an employer may sample a representative fraction of the employees instead of all employees in order to meet this requirement. In representative sampling, the employer shall sample the employee(s) expected to have the highest cadmium exposures.
- (2) Specific.
- (i) Initial monitoring. Except as provided for in paragraph (d)(2)(iii) of this section, where a determination conducted under paragraph (d)(1)(i) of this section shows the possibility of employee exposure to cadmium at or above the action level, the employer shall conduct exposure monitoring as soon as practicable that is representative of the exposure for each employee in the workplace who is or may be exposed to cadmium at or above the action level.
 - (ii) In addition, if the employee periodically performs tasks that may expose the employee to a higher concentration of airborne cadmium, the employee shall be monitored while performing those tasks.
 - (iii) Where the employer has objective data, as defined in paragraph (n)(2) of this section, demonstrating that employee exposure to cadmium will not exceed airborne concentrations at or above the action level under the expected conditions of processing, use, or handling, the employer may rely upon such data instead of implementing initial monitoring.
 - (iv) Where a determination conducted under paragraphs (d)(1) or (d)(2) of this section is made that a potentially exposed employee is not exposed to airborne concentrations of cadmium at or above the action level, the employer shall make a written record of such determination. The record shall include at least the monitoring data developed under paragraphs (d)(2)(i)-(iii) of this section, where applicable, and shall also include the date of determination, and the name and social security number of each employee.
- (3) Monitoring frequency (periodic monitoring).
- (i) If the initial monitoring or periodic monitoring reveals employee exposures to be at or above the action level, the employer shall monitor at a frequency and pattern needed to assure that the monitoring results reflect with reasonable accuracy the employee's typical exposure levels, given the variability in the tasks performed, work practices, and environmental conditions on the job site, and to assure the adequacy of respiratory selection and the effectiveness of engineering and work practice controls.
 - (ii) If the initial monitoring or the periodic monitoring indicates that employee exposures are below the action level and that result is confirmed by the results of another monitoring taken at least seven days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.
- (4) Additional monitoring. The employer also shall institute the exposure monitoring required

under paragraphs (d)(2)(i) and (d)(3) of this section whenever there has been a change in the raw materials, equipment, personnel, work practices, or finished products that may result in additional employees being exposed to cadmium at or above the action level or in employees already exposed to cadmium at or above the action level being exposed above the PEL, or whenever the employer or competent person has any reason to suspect that any other change might result in such further exposure.

- (5) Employee notification of monitoring results.
 - (i) The employer must, as soon as possible but no later than 5 working days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results either individually in writing or by posting the results in an appropriate location that is accessible to employees.
 - (ii) Wherever monitoring results indicate that employee exposure exceeds the PEL, the employer shall include in the written notice a statement that the PEL has been exceeded and a description of the corrective action being taken by the employer to reduce employee exposure to or below the PEL.
- (6) Accuracy of measurement. The employer shall use a method of monitoring and analysis that has an accuracy of not less than plus or minus 25 percent ($\pm 25\%$), with a confidence level of 95 percent, for airborne concentrations of cadmium at or above the action level and the permissible exposure limit.
- (e) Regulated areas.
 - (1) Establishment. The employer shall establish a regulated area wherever an employee's exposure to airborne concentrations of cadmium is, or can reasonably be expected to be in excess of the permissible exposure limit (PEL).
 - (2) Demarcation. Regulated areas shall be demarcated from the rest of the workplace in any manner that adequately establishes and alerts employees of the boundaries of the regulated area, including employees who are or may be incidentally in the regulated areas, and that protects persons outside the area from exposure to airborne concentrations of cadmium in excess of the PEL.
 - (3) Access. Access to regulated areas shall be limited to authorized persons.
 - (4) Provision of respirators. Each person entering a regulated area shall be supplied with and required to use a respirator, selected in accordance with paragraph (g)(2) of this section.
 - (5) Prohibited activities. The employer shall assure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas, or carry the products associated with any of these activities into regulated areas or store such products in those areas.
- (f) Methods of compliance.
 - (1) Compliance hierarchy.
 - (i) Except as specified in paragraph (f)(1)(ii) of this section, the employer shall implement engineering and work practice controls to reduce and maintain employee exposure to cadmium at or below the PEL, except to the extent that the employer can demonstrate that such controls are not feasible.
 - (ii) The requirement to implement engineering controls to achieve the PEL does not apply where the employer demonstrates the following:
 - (A) The employee is only intermittently exposed; and
 - (B) The employee is not exposed above the PEL on 30 or more days per year (12 consecutive months).
 - (iii) Wherever engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer nonetheless shall implement such controls to reduce exposures to the lowest levels achievable. The employer shall supplement such controls with respiratory protection that complies with the requirements of paragraph (g) of this section and the PEL.

- (iv) The employer shall not use employee rotation as a method of compliance.
- (2) Specific operations
 - (i) Abrasive blasting. Abrasive blasting on cadmium or cadmium-containing materials shall be conducted in a manner that will provide adequate protection.
 - (ii) Heating cadmium and cadmium-containing materials. Welding, cutting, and other forms of heating of cadmium or cadmium-containing materials shall be conducted in accordance with the requirements of 29 CFR 1926.353 and 29 CFR 1926.354, where applicable.
- (3) Prohibitions.
 - (i) High speed abrasive disc saws and similar abrasive power equipment shall not be used for work on cadmium or cadmium-containing materials unless they are equipped with appropriate engineering controls to minimize emissions, if the exposure levels are above the PEL.
 - (ii) Materials containing cadmium shall not be applied by spray methods, if exposures are above the PEL, unless employees are protected with supplied-air respirators with full facepiece, hood, helmet, suit, operated in positive pressure mode and measures are instituted to limit overspray and prevent contamination of adjacent areas.
- (4) Mechanical ventilation.
 - (i) When ventilation is used to control exposure, measurements that demonstrate the effectiveness of the system in controlling exposure, such as capture velocity, duct velocity, or static pressure shall be made as necessary to maintain its effectiveness.
 - (ii) Measurements of the system's effectiveness in controlling exposure shall be made as necessary within five working days of any change in production, process, or control that might result in a significant increase in employee exposure to cadmium.
 - (iii) Recirculation of air. If air from exhaust ventilation is recirculated into the workplace, the system shall have a high efficiency filter and be monitored to assure effectiveness.
 - (iv) Procedures shall be developed and implemented to minimize employee exposure to cadmium when maintenance of ventilation systems and changing of filters is being conducted.
- (5) Compliance program.
 - (i) Where employee exposure to cadmium exceeds the PEL and the employer is required under paragraph (f)(1) of this section to implement controls to comply with the PEL, prior to the commencement of the job the employer shall establish and implement a written compliance program to reduce employee exposure to or below the PEL. To the extent that engineering and work practice controls cannot reduce exposures to or below the PEL, the employer shall include in the written compliance program the use of appropriate respiratory protection to achieve compliance with the PEL.
 - (ii) Written compliance programs shall be reviewed and updated as often and as promptly as necessary to reflect significant changes in the employer's compliance status or significant changes in the lowest air cadmium level that is technologically feasible.
 - (iii) A competent person shall review the comprehensive compliance program initially and after each change.
 - (iv) Written compliance programs shall be provided upon request for examination and copying to the Assistant Secretary, the Director, affected employees, and designated employee representatives.
- (g) Respirator protection.

- (1) General. For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this paragraph. Respirators must be used during:
 - (i) Periods necessary to install or implement feasible engineering and work-practice controls when employee exposures exceed the PEL.
 - (ii) Maintenance and repair activities, and brief or intermittent work operations, for which employee exposures exceed the PEL and engineering and work-practice controls are not feasible or are not required.
 - (iii) Work operations in the regulated areas specified in paragraph (e) of this section.
 - (iv) Work operations for which the employer has implemented all feasible engineering and work-practice controls, and such controls are not sufficient to reduce employee exposures to or below the PEL.
 - (v) Work operations for which an employee, who is exposed to cadmium at or above the action level, requests a respirator.
 - (vi) Work operations for which engineering controls are not required by paragraph (f)(1)(ii) of this section to reduce employee exposures that exceed the PEL.
 - (vii) Emergencies.
- (2) Respirator program.
 - (i) The employer must implement a respiratory protection program in accordance with 29 CFR 1910.134 (b) through (d) (except (d)(1)(iii)), and (f) through (m).
 - (ii) If an employee exhibits breathing difficulty during fit testing or respirator use, the employer must provide the employee with a medical examination in accordance with paragraph (l)(6)(ii) of this section to determine if the employee can use a respirator while performing the required duties.
 - (iii) No employee must use a respirator when, based on their most recent medical examination, the examining physician determines that the employee will be unable to continue to function normally while using a respirator. If the physician determines the employee must be limited in, or removed from, their current job because of the employee's inability to use a respirator, the job limitation or removal must be conducted in accordance with paragraphs (l)(11) and (12) of this section.
- (3) Respirator selection.
 - (i) The employer must select the appropriate respirator from Table 1 of this section.

Table 1
RESPIRATORY PROTECTION FOR CADMIUM

Airborne concentration or condition of use ^a	Required respirator type ^b
10 x or less	A half-mask, air-purifying respirator equipped with a HEPA ^c filter. ^d
25 x or less	A powered air-purifying respirator ("PAPR") with a loose fitting hood or helmet equipped with a HEPA filter, or a supplied-air respirator with a loose-fitting hood or helmet facepiece operated in the continuous flow mode.
50 x or less	A full facepiece air-purifying respirator equipped with a HEPA filter, or a powered air-purifying respirator with a tight-fitting half mask equipped with a HEPA filter, or a supplied air respirator with a tight-fitting half mask operated in the continuous flow mode.
250 x or less	A powered air purifying respirator with a tight fitting full facepiece equipped with a HEPA filter, or a supplied-air respirator with a tight fitting full facepiece operated in the continuous flow mode.
1000 x or less	A supplied-air respirator with half mask or full facepiece operated in the pressure demand or other positive pressure mode.

>1000 x or unknown concentrations.	A self-contained breathing apparatus with a full facepiece operated in the pressure demand or other positive pressure mode, or a supplied-air respirator with a full facepiece operated in the pressure demand or other positive pressure mode and equipped with an auxiliary escape type self contained breathing apparatus operated in the pressure demand mode.
Fire fighting	A self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

^aConcentrations expressed as multiple of the PEL.

^bRespirators assigned for higher environmental concentrations may be used at lower exposure levels. Quantitative fit testing is required for all tight fitting air purifying respirators where airborne concentration of cadmium exceeds 10 times the TWA PEL ($105 \mu\text{g}/\text{m}^3 = 50 \mu\text{g}/\text{m}^3$). A full facepiece respirator is required when eye irritation is experienced.

^cHEPA means High Efficiency Particulate Air.

^dFit testing, qualitative or quantitative, is required.

Source: Respiratory Decision Logic, NIOSH, 1987.

- (ii) The employer must provide a powered air-purifying respirator instead of a negative-pressure respirator when an employee entitled to a respirator chooses to use this type of respirator and such a respirator will provide adequate protection to the employee.
- (h) Emergency situations. The employer shall develop and implement a written plan for dealing with emergency situations involving substantial releases of airborne cadmium. The plan shall include provisions for the use of appropriate respirators and personal protective equipment. In addition, employees not essential to correcting the emergency situation shall be restricted from the area and normal operations halted in that area until the emergency is abated.
- (i) Protective work clothing and equipment.
 - (1) Provision and use. If an employee is exposed to airborne cadmium above the PEL or where skin or eye irritation is associated with cadmium exposure at any level, the employer shall provide at no cost to the employee, and assure that the employee uses, appropriate protective work clothing and equipment that prevents contamination of the employee and the employee's garments. Protective work clothing and equipment includes, but is not limited to:
 - (i) Coveralls or similar full body work clothing;
 - (ii) Gloves, head coverings, and boots or foot coverings; and
 - (iii) Face shields, vented goggles, or other appropriate protective equipment that complies with 29 CFR 1910.133.
 - (2) Removal and storage.
 - (i) The employer shall assure that employees remove all protective clothing and equipment contaminated with cadmium at the completion of the work shift and do so only in change rooms provided in accordance with paragraph (j)(1) of this section.
 - (ii) The employer shall assure that no employee takes cadmium contaminated protective clothing or equipment from the workplace, except for employees authorized to do so for purposes of laundering, cleaning, maintaining, or disposing of cadmium contaminated protective clothing and equipment at an appropriate location or facility away from the workplace.
 - (iii) The employer shall assure that contaminated protective clothing and equipment, when removed for laundering, cleaning, maintenance, or disposal, is placed and stored in sealed, impermeable bags or other closed, impermeable containers that are designed to prevent dispersion of cadmium dust.
 - (iv) The employer shall assure that containers of contaminated protective clothing and equipment that are to be taken out of the change rooms or the workplace for laundering, cleaning, maintenance or disposal shall bear labels in accordance with paragraph (m)(2) of this section.
 - (3) Cleaning, replacement, and disposal.

- (i) The employer shall provide the protective clothing and equipment required by paragraph (i)(1) of this section in a clean and dry condition as often as necessary to maintain its effectiveness, but in any event at least weekly. The employer is responsible for cleaning and laundering the protective clothing and equipment required by this paragraph to maintain its effectiveness and is also responsible for disposing of such clothing and equipment.
 - (ii) The employer also is responsible for repairing or replacing required protective clothing and equipment as needed to maintain its effectiveness. When rips or tears are detected while an employee is working they shall be immediately mended, or the work suit shall be immediately replaced.
 - (iii) The employer shall prohibit the removal of cadmium from protective clothing and equipment by blowing, shaking, or any other means that disperses cadmium into the air.
 - (iv) The employer shall assure that any laundering of contaminated clothing or cleaning of contaminated equipment in the workplace is done in a manner that prevents the release of airborne cadmium in excess of the permissible exposure limit prescribed in paragraph (c) of this section.
 - (v) The employer shall inform any person who launders or cleans protective clothing or equipment contaminated with cadmium of the potentially harmful effects of exposure to cadmium, and that the clothing and equipment should be laundered or cleaned in a manner to effectively prevent the release of airborne cadmium in excess of the PEL.
- (j) Hygiene areas and practices.
 - (1) General. For employees whose airborne exposure to cadmium is above the PEL, the employer shall provide clean change rooms, hand washing facilities, showers, and lunchroom facilities that comply with 29 CFR 1926.51.
 - (2) Change rooms. The employer shall assure that change rooms are equipped with separate storage facilities for street clothes and for protective clothing and equipment, which are designed to prevent dispersion of cadmium and contamination of the employee's street clothes.
 - (3) Showers and hand washing facilities.
 - (i) The employer shall assure that employees whose airborne exposure to cadmium is above the PEL shower during the end of the work shift.
 - (ii) The employer shall assure that employees who are exposed to cadmium above the PEL wash their hands and faces prior to eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics.
 - (4) Lunchroom facilities.
 - (i) The employer shall assure that the lunchroom facilities are readily accessible to employees, that tables for eating are maintained free of cadmium, and that no employee in a lunchroom facility is exposed at any time to cadmium at or above a concentration of 2.5 g/m^3 .
 - (ii) The employer shall assure that employees do not enter lunchroom facilities with protective work clothing or equipment unless surface cadmium has been removed from the clothing and equipment by HEPA vacuuming or some other method that removes cadmium dust without dispersing it.
- (k) Housekeeping.
 - (1) All surfaces shall be maintained as free as practicable of accumulations of cadmium.
 - (2) All spills and sudden releases of material containing cadmium shall be cleaned up as soon as possible.
 - (3) Surfaces contaminated with cadmium shall, wherever possible, be cleaned by vacuuming or other methods that minimize the likelihood of cadmium becoming airborne.
 - (4) HEPA-filtered vacuuming equipment or equally effective filtration methods shall be used for vacuuming. The equipment shall be used and emptied in a manner that minimizes the reentry of cadmium into the workplace.
 - (5) Shoveling, dry or wet sweeping, and brushing may be used only where vacuuming or other methods that minimize the likelihood of cadmium becoming airborne have been tried and found not to be effective.

- (6) Compressed air shall not be used to remove cadmium from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air.
- (7) Waste, scrap, debris, bags, containers, personal protective equipment, and clothing contaminated with cadmium and consigned for disposal shall be collected and disposed of in sealed impermeable bags or other closed, impermeable containers. These bags and containers shall be labeled in accordance with paragraph (m)(2) of this section.
- (I) Medical Surveillance.
 - (1) General.
 - (i) Scope.
 - (A) Currently exposed - The employer shall institute a medical surveillance program for all employees who are or may be exposed at or above the action level and all employees who perform the following tasks, operations or jobs: Electrical grounding with cadmium welding; cutting, brazing, burning, grinding or welding on surfaces that were painted with cadmium-containing paints; electrical work using cadmium-coated conduit; use of cadmium containing paints; cutting and welding cadmium-plated steel; brazing or welding with cadmium alloys; fusing of reinforced steel by cadmium welding; maintaining or retrofitting cadmium-coated equipment; and, wrecking and demolition where cadmium is present. A medical surveillance program will not be required if the employer demonstrates that the employee:
 - (1) Is not currently exposed by the employer to airborne concentrations of cadmium at or above the action level on 30 or more days per year (twelve consecutive months); and,
 - (2) Is not currently exposed by the employer in those tasks on 30 or more days per year (twelve consecutive months).
 - (B) Previously exposed - The employer shall also institute a medical surveillance program for all employees who might previously have been exposed to cadmium by the employer prior to the effective date of this standard in tasks specified under paragraph (I)(1)(i)(A) of this section, unless the employer demonstrates that the employee did not in the years prior to the effective date of this section work in those tasks for the employer with exposure to cadmium for an aggregated total of more than 12 months.
 - (ii) To determine an employee's fitness for using a respirator, the employer shall provide the limited medical examination specified in paragraph (I)(6) of this section.
 - (iii) The employer shall assure that all medical examinations and procedures required by this section are performed by or under the supervision of a licensed physician, who has read and is familiar with the health effects section of appendix A to this section, the regulatory text of this section, the protocol for sample handling and lab selection in appendix F to this section, and the questionnaire of appendix D to this section.
 - (iv) The employer shall provide the medical surveillance required by this section, including multiple physician review under paragraph (I)(13) of this section without cost to employees, and at a time and place that is reasonable and convenient to employees.
 - (v) The employer shall assure that the collecting and handling of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine (β_2 -M) taken from employees under this section is done in a manner that assures their reliability and that analysis of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine (β_2 -M) taken from employees under this section is performed in laboratories with demonstrated proficiency to perform the particular analysis. (See appendix F to this section.)
 - (2) Initial Examination.
 - (i) For employees covered by medical surveillance under paragraph (I)(1)(i) of this section, the employer shall provide an initial medical examination. The examination shall be provided to those employees within 30 days after initial assignment to a job with exposure to cadmium or no later than 90 days after the effective date of this section, whichever date is later.
 - (ii) The initial medical examination shall include:

- (A) A detailed medical and work history, with emphasis on: Past, present, and anticipated future exposure to cadmium; any history of renal, cardiovascular, respiratory, hematopoietic, reproductive, and/or muscular-skeletal system dysfunction; current usage of medication with potential nephrotoxic side effects; and smoking history and current status; and
 - (B) Biological monitoring that includes the following tests:
 - (1) Cadmium in urine (CdU), standardized to grams of creatinine (g/Cr);
 - (2) Beta-2 microglobulin in urine (β_2 -M), standardized to grams of creatinine (g/Cr), with pH specified, as described in Appendix F to this section; and
 - (3) Cadmium in blood (CdB), standardized to liters of whole blood (lwb).
 - (iii) Recent Examination: An initial examination is not required to be provided if adequate records show that the employee has been examined in accordance with the requirements of paragraph (l)(2)(ii) of this section within the past 12 months. In that case, such records shall be maintained as part of the employee's medical record and the prior exam shall be treated as if it were an initial examination for the purposes of paragraphs (l)(3) and (4) of this section.
- (3) Actions triggered by initial biological monitoring.
- (i) If the results of the biological monitoring tests in the initial examination show the employee's CdU level to be at or below $3\mu\text{g/g Cr}$, β_2 -M level to be at or below $300\mu\text{g/g Cr}$ and CdB level to be at or below $5\mu\text{g/lwb}$, then:
 - (A) For employees who are subject to medical surveillance under paragraphs (l)(1)(i)(A) of this section because of current or anticipated exposure to cadmium, the employer shall provide the minimum level of periodic medical surveillance in accordance with the requirements in paragraph (l)(4)(i) of this section; and
 - (B) For employees who are subject to medical surveillance under paragraph (l)(1)(i)(B) of this section because of prior but not current exposure, the employer shall provide biological monitoring for CdU, β_2 -M, and CdB one year after the initial biological monitoring and then the employer shall comply with the requirements of paragraph (l)(4)(vi) of this section.
 - (ii) For all employees who are subject to medical surveillance under paragraph (l)(1)(i) of this section, if the results of the initial biological monitoring tests show the level of CdU to exceed $3\mu\text{g/g Cr}$, the level of β_2 -M to be in excess of $300\mu\text{g/g Cr}$, or the level of CdB to be in excess of $5\mu\text{g/lwb}$, the employer shall:
 - (A) Within two weeks after receipt of biological monitoring results, reassess the employee's occupational exposure to cadmium as follows:
 - (1) Reassess the employee's work practices and personal hygiene;
 - (2) Reevaluate the employee's respirator use, if any, and the respirator program;
 - (3) Review the hygiene facilities;
 - (4) Reevaluate the maintenance and effectiveness of the relevant engineering controls;
 - (5) Assess the employee's smoking history and status;
 - (B) Within 30 days after the exposure reassessment, specified in paragraph (l)(3)(ii)(A) of this section, take reasonable steps to correct any deficiencies found in the reassessment that may be responsible for the employee's excess exposure to cadmium; and,
 - (C) Within 90 days after receipt of biological monitoring results, provide a full medical examination to the employee in accordance with the requirements of paragraph (l)(4)(ii) of this section. After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. If the physician determines that medical removal is not necessary, then until the employee's CdU level falls to or below $3\mu\text{g/g Cr}$, β_2 -M level falls to or below $300\mu\text{g/g Cr}$ and CdB level falls to or below $5\mu\text{g/lwb}$, the employer shall:
 - (1) Provide biological monitoring in accordance with paragraph (l)(2)(ii)(B) of this section on a semiannual basis; and
 - (2) Provide annual medical examinations in accordance with paragraph (l)(4)(ii) of this section.

- (iii) For all employees who are subject to medical surveillance under paragraph (l)(1)(i) of this section, if the results of the initial biological monitoring tests show the level of CdU to be in excess of 15 µg/g Cr, or the level of CdB to be in excess of 15 µg/lwb, or the level of β_2 M to be in excess of 1,500 µg/g Cr, the employer shall comply with the requirements of paragraphs (l)(3)(ii)(A)-(B) of this section. Within 90 days after receipt of biological monitoring results, the employer shall provide a full medical examination to the employee in accordance with the requirements of paragraph (l)(4)(ii) of this section. After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. However, if the initial biological monitoring results and the biological monitoring results obtained during the medical examination both show that: CdU exceeds 15 µg/g Cr; or CdB exceeds 15 µg/lwb; or β_2 M exceeds 1500 µg/g Cr, and in addition CdU exceeds 3 µg/g Cr or CdB exceeds 5 µg/liter of whole blood, then the physician shall medically remove the employee from exposure to cadmium at or above the action level. If the second set of biological monitoring results obtained during the medical examination does not show that a mandatory removal trigger level has been exceeded, then the employee is not required to be removed by the mandatory provisions of this paragraph. If the employee is not required to be removed by the mandatory provisions of this paragraph or by the physician's determination, then until the employee's CdU level falls to or below 3 µg/g Cr, β_2 -M level falls to or below 300 µg/g Cr and CdB level falls to or below 5 µg/lwb, the employer shall:
 - (A) Periodically reassess the employee's occupational exposure to cadmium;
 - (B) Provide biological monitoring in accordance with paragraph (l)(2)(ii)(B) of this section on a quarterly basis; and
 - (C) Provide semiannual medical examinations in accordance with paragraph (l)(4)(ii) of this section.
 - (iv) For all employees to whom medical surveillance is provided, beginning on January 1, 1999, and in lieu of paragraph (l)(3)(iii) of this section, whenever the results of initial biological monitoring tests show the employee's CdU level to be in excess of 7 µg/g Cr, or β_2 -M level to be in excess of 750 µg/g Cr, or CdB level to be in excess of 10 µg/lwb, the employer shall comply with the requirements of paragraphs (l)(3)(ii)(A)-(B) of this section. Within 90 days after receipt of biological monitoring results, the employer shall provide a full medical examination to the employee in accordance with the requirements of paragraph (l)(4)(ii) of this section. After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. However, if the initial biological monitoring results and the biological monitoring results obtained during the medical examination both show that: CdU exceeds 7 µg/g Cr; or CdB exceeds 10 µg/lwb; or β_2 -M exceeds 750 µg/g Cr, and in addition CdU exceeds 3 µg/g Cr or CdB exceeds 5 µg/liter of whole blood, then the physician shall medically remove the employee from exposure to cadmium at or above the action level. If the second set of biological monitoring results obtained during the medical examination does not show that a mandatory removal trigger level has been exceeded, then the employee is not required to be removed by the mandatory provisions of this paragraph. If the employee is not required to be removed by the mandatory provisions of this paragraph or by the physician's determination, then until the employee's CdU level falls to or below 3 µg/g Cr, β_2 -M level falls to or below 300 µg/g Cr and CdB level falls to or below 5 µg/lwb, the employer shall:
 - (A) Periodically reassess the employee's occupational exposure to cadmium;
 - (B) Provide biological monitoring in accordance with paragraph (l)(2)(ii)(B) of this section on a quarterly basis; and
 - (C) Provide semiannual medical examinations in accordance with paragraph (l)(4)(ii) of this section.
- (4) Periodic medical surveillance.
 - (i) For each employee who is covered by medical surveillance under paragraph (l)(1)(i)(A) of this section because of current or anticipated exposure to cadmium, the employer shall provide at least the minimum level of periodic medical surveillance, which consists of periodic medical examinations and periodic biological monitoring. A periodic medical examination shall be provided within one

year after the initial examination required by paragraph (l)(2) of this section and thereafter at least biennially. Biological sampling shall be provided at least annually either as part of a periodic medical examination or separately as periodic biological monitoring.

- (ii) The periodic medical examination shall include:
 - (A) A detailed medical and work history, or update thereof, with emphasis on: Past, present and anticipated future exposure to cadmium; smoking history and current status; reproductive history; current use of medications with potential nephrotoxic side effects; any history of renal, cardiovascular, respiratory, hematopoietic, and/or muscular-skeletal system dysfunction; and as part of the medical and work history, for employees who wear respirators, questions 3-11 and 25-32 in appendix D to this section;
 - (B) A complete physical examination with emphasis on: blood pressure, the respiratory system, and the urinary system;
 - (C) A 14-inch by 17 inch, or a reasonably standard sized posterior-anterior chest X-ray (after the initial X-ray, the frequency of chest X-rays is to be determined by the examining physician);
 - (D) Pulmonary function tests, including forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV1);
 - (E) Biological monitoring, as required in paragraph (l)(2)(ii)(B) of this section;
 - (F) Blood analysis, in addition to the analysis required under paragraph (l)(2)(ii)(B) of this section, including blood urea nitrogen, complete blood count, and serum creatinine;
 - (G) Urinalysis, in addition to the analysis required under paragraph (l)(2)(ii)(B) of this section, including the determination of albumin, glucose, and total and low molecular weight proteins;
 - (H) For males over 40 years old, prostate palpation, or other at least as effective diagnostic test(s), and;
 - (I) Any additional tests or procedures deemed appropriate by the examining physician.
- (iii) Periodic biological monitoring shall be provided in accordance with paragraph (l)(2)(ii)(B) of this section.
- (iv) If the results of periodic biological monitoring or the results of biological monitoring performed as part of the periodic medical examination show the level of the employee's CdU, β_2 -M, or CdB to be in excess of the levels specified in paragraphs (l)(3)(ii) or (iii) of this section; or, beginning on January 1, 1999, in excess of the levels specified in paragraph (l)(3)(ii) or (iv), the employer shall take the appropriate actions specified in paragraphs (l)(3)(ii)-(iv) of this section, respectively.
- (v) For previously exposed employees under paragraph (l)(1)(i)(B) of this section:
 - (A) If the employee's levels of CdU did not exceed 3 μ g/g Cr, CdB did not exceed 5 μ g/lwb, and β_2 -M did not exceed 300 μ g/g Cr in the initial biological monitoring tests, and if the results of the follow-up biological monitoring required by paragraph (l)(3)(i)(B) of this section one year after the initial examination confirm the previous results, the employer may discontinue all periodic medical surveillance for that employee.
 - (B) If the initial biological monitoring results for CdU, CdB, or β_2 -M were in excess of the levels specified in paragraph (l)(3)(i) of this section, but subsequent biological monitoring results required by paragraph (l)(3)(ii)-(iv) of this section show that the employee's CdU levels no longer exceed 3 μ g/g Cr, CdB levels no longer exceed 5 μ g/lwb, and β_2 -M levels no longer exceed 300 μ g/g Cr, the employer shall provide biological monitoring for CdU, CdB, and β_2 -M one year after these most recent biological monitoring results. If the results of the follow-up biological monitoring specified in this paragraph, confirm the previous results, the employer may discontinue all periodic medical surveillance for that employee.
 - (C) However, if the results of the follow-up tests specified in paragraph (l)(4)(v)(A) or (B) of this section indicate that the level of the employee's CdU, β_2 -M, or CdB exceeds these same levels, the employer is required to provide annual medical examinations in accordance with the provisions of paragraph (l)(4)(ii)

of this section until the results of biological monitoring are consistently below these levels or the examining physician determines in a written medical opinion that further medical surveillance is not required to protect the employee's health.

- (vi) A routine, biennial medical examination is not required to be provided in accordance with paragraphs (l)(3)(i) and (l)(4) of this section if adequate medical records show that the employee has been examined in accordance with the requirements of paragraph (l)(4)(ii) of this section within the past 12 months. In that case, such records shall be maintained by the employer as part of the employee's medical record, and the next routine, periodic medical examination shall be made available to the employee within two years of the previous examination.
- (5) Actions triggered by medical examinations.
 - (i) If the results of a medical examination carried out in accordance with this section indicate any laboratory or clinical finding consistent with cadmium toxicity that does not require employer action under paragraphs (l)(2), (3) or (4) of this section, the employer shall take the following steps and continue to take them until the physician determines that they are no longer necessary.
 - (A) Periodically reassess: The employee's work practices and personal hygiene; the employee's respirator use, if any; the employee's smoking history and status; the respiratory protection program; the hygiene facilities; the maintenance and effectiveness of the relevant engineering controls; and take all reasonable steps to correct the deficiencies found in the reassessment that may be responsible for the employee's excess exposure to cadmium.
 - (B) Provide semiannual medical reexaminations to evaluate the abnormal clinical sign(s) of cadmium toxicity until the results are normal or the employee is medically removed; and
 - (C) Where the results of tests for total proteins in urine are abnormal, provide a more detailed medical evaluation of the toxic effects of cadmium on the employee's renal system.
- (6) Examination for respirator use.
 - (i) To determine an employee's fitness for respirator use, the employer shall provide a medical examination that includes the elements specified in paragraph (l)(6)(i)(A)-(D) of this section. This examination shall be provided prior to the employee's being assigned to a job that requires the use of a respirator or no later than 90 days after this section goes into effect, whichever date is later, to any employee without a medical examination within the preceding 12 months that satisfies the requirements of this paragraph.
 - (A) A detailed medical and work history, or update thereof, with emphasis on: past exposure to cadmium; smoking history and current status; any history of renal, cardiovascular, respiratory, hematopoietic, and/or musculo-skeletal system dysfunction; a description of the job for which the respirator is required; and questions 3-11 and 25-32 in appendix D;
 - (B) A blood pressure test;
 - (C) Biological monitoring of the employee's levels of CdU, CdB and β_2 -M in accordance with the requirements of paragraph (l)(2)(ii)(B) of this section, unless such results already have been obtained within the twelve months; and
 - (D) Any other test or procedure that the examining physician deems appropriate.
 - (ii) After reviewing all the information obtained from the medical examination required in paragraph (l)(6)(i) of this section, the physician shall determine whether the employee is fit to wear a respirator.
 - (iii) Whenever an employee has exhibited difficulty in breathing during a respirator fit test or during use of a respirator, the employer, as soon as possible, shall provide the employee with a periodic medical examination in accordance with paragraph (l)(4)(ii) of this section to determine the employee's fitness to wear a respirator.
 - (iv) Where the results of the examination required under paragraphs (l)(6)(i), (ii) or (iii) of this section are abnormal, medical limitation or prohibition of respirator use shall be considered. If the employee is allowed to wear a respirator, the employee's ability to continue to do so shall be periodically evaluated by a physician.
- (7) Emergency Examinations.

- (i) In addition to the medical surveillance required in paragraphs (l)(2)-(6) of this section, the employer shall provide a medical examination as soon as possible to any employee who may have been acutely exposed to cadmium because of an emergency.
 - (ii) The examination shall include the requirements of paragraph (l)(4)(ii), of this section, with emphasis on the respiratory system, other organ systems considered appropriate by the examining physician, and symptoms of acute overexposure, as identified in paragraphs II(B)(1)-(2) and IV of appendix A of this section.
- (8) Termination of employment examination.
 - (i) At termination of employment, the employer shall provide a medical examination in accordance with paragraph (l)(4)(ii) of this section, including a chest X-ray where necessary, to any employee to whom at any prior time the employer was required to provide medical surveillance under paragraph (l)(1)(i) or (l)(7) of this section. However, if the last examination satisfied the requirements of paragraph (l)(4)(ii) of this section and was less than six months prior to the date of termination, no further examination is required unless otherwise specified in paragraph (l)(3) or (l)(5) of this section;
 - (ii) In addition, if the employer has discontinued all periodic medical surveillance under paragraph (l)(4)(v) of this section, no termination of employment medical examination is required.
- (9) Information provided to the physician. The employer shall provide the following information to the examining physician:
 - (i) A copy of this standard and appendices;
 - (ii) A description of the affected employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to cadmium;
 - (iii) The employee's former, current, and anticipated future levels of occupational exposure to cadmium;
 - (iv) A description of any personal protective equipment, including respirators, used or to be used by the employee, including when and for how long the employee has used that equipment; and
 - (v) relevant results of previous biological monitoring and medical examinations.
- (10) Physician's written medical opinion.
 - (i) The employer shall promptly obtain a written, signed medical opinion from the examining physician for each medical examination performed on each employee. This written opinion shall contain:
 - (A) The physician's diagnosis for the employee;
 - (B) The physician's opinion as to whether the employee has any detected medical condition(s) that would place the employee at increased risk of material impairment to health from further exposure to cadmium, including any indications of potential cadmium toxicity;
 - (C) The results of any biological or other testing or related evaluations that directly assess the employee's absorption of cadmium;
 - (D) Any recommended removal from, or limitation on the activities or duties of the employee or on the employee's use of personal protective equipment, such as respirators;
 - (E) A statement that the physician has clearly and carefully explained to the employee the results of the medical examination, including all biological monitoring results and any medical conditions related to cadmium exposure that require further evaluation or treatment, and any limitation on the employee's diet or use of medications.
 - (ii) The employer shall promptly obtain a copy of the results of any biological monitoring provided by an employer to an employee independently of a medical examination under paragraphs (l)(2) and (l)(4) of this section, and, in lieu of a written medical opinion, an explanation sheet explaining those results.
 - (iii) The employer shall instruct the physician not to reveal orally or in the written medical opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to cadmium.
- (11) Medical Removal Protection (MRP).
 - (i) General.

- (A) The employer shall temporarily remove an employee from work where there is excess exposure to cadmium on each occasion that medical removal is required under paragraphs (l)(3), (l)(4), or (l)(6) of this section and on each occasion that a physician determines in a written medical opinion that the employee should be removed from such exposure. The physician's determination may be based on biological monitoring results, inability to wear a respirator, evidence of illness, other signs or symptoms of cadmium related dysfunction or disease, or any other reason deemed medically sufficient by the physician.
- (B) The employer shall medically remove an employee in accordance with paragraph (l)(11) of this section regardless of whether at the time of removal a job is available into which the removed employee may be transferred.
- (C) Whenever an employee is medically removed under paragraph (l)(11) of this section, the employer shall transfer the removed employee to a job where the exposure to cadmium is within the permissible levels specified in that paragraph as soon as one becomes available.
- (D) For any employee who is medically removed under the provisions of paragraph (l)(11)(i) of this section, the employer shall provide follow-up medical examinations semiannually until, in a written medical opinion, the examining physician determines that either the employee may be returned to his/her former job status or the employee must be permanently removed from excess cadmium exposure.
- (E) The employer may not return an employee who has been medically removed for any reason to his/her former job status until a physician determines in a written medical opinion that continued medical removal is no longer necessary to protect the employee's health.
- (ii) Where an employee is found unfit to wear a respirator under paragraph (l)(6)(ii) of this section, the employer shall remove the employee from work where exposure to cadmium is above the PEL.
- (iii) Where removal is based upon any reason other than the employee's inability to wear a respirator, the employer shall remove the employee from work where exposure to cadmium is at or above the action level.
- (iv) Except as specified in paragraph (l)(11)(v) of this section, no employee who was removed because his/her level of CdU, CdB and/or β_2 M exceeded the trigger levels in paragraph (l)(3) or (l)(4) of this section may be returned to work with exposure to cadmium at or above the action level until the employee's levels of CdU fall to or below 3 μ g/g Cr, CdB fall to or below 5 μ g/lwb, and β_2 M fall to or below 300 μ g/g Cr.
- (v) However, when in the examining physician's opinion continued exposure to cadmium will not pose an increased risk to the employee's health and there are special circumstances that make continued medical removal an inappropriate remedy, the physician shall fully discuss these matters with the employee, and then in a written determination may return a worker to his/her former job status despite what would otherwise be unacceptably high biological monitoring results. Thereafter and until such time as the employee's biological monitoring results have decreased to levels where he/she could have been returned to his/her former job status, the returned employee shall continue medical surveillance as if he/she were still on medical removal. Until such time, the employee is no longer subject to mandatory medical removal. Subsequent questions regarding the employee's medical removal shall be decided solely by a final medical determination.
- (vi) Where an employer, although not required by this section to do so, removes an employee from exposure to cadmium or otherwise places limitations on an employee due to the effects of cadmium exposure on the employee's medical condition, the employer shall provide the same medical removal protection benefits to that employee under paragraph (l)(12) of this section as would have been provided had the removal been required under paragraph (l)(11) of this section.
- (12) Medical removal protection benefits.
 - (i) The employer shall provide medical removal protection benefits to an employee for up to a maximum of 18 months each time, and while the employee is temporarily medically removed under paragraph (l)(11) of this section.

- (ii) For purposes of this section, the requirement that the employer provide medical removal protection benefits means that the employer shall maintain the total normal earnings, seniority, and all other employee rights and benefits of the removed employee, including the employee's right to his/her former job status, as if the employee had not been removed from the employee's job or otherwise medically limited.
 - (iii) Where, after 18 months on medical removal because of elevated biological monitoring results, the employee's monitoring results have not declined to a low enough level to permit the employee to be returned to his/her former job status:
 - (A) The employer shall make available to the employee a medical examination pursuant to this section in order to obtain a final medical determination as to whether the employee may be returned to his/her former job status or must be permanently removed from excess cadmium exposure; and
 - (B) The employer shall assure that the final medical determination indicates whether the employee may be returned to his/her former job status and what steps, if any, should be taken to protect the employee's health;
 - (iv) The employer may condition the provision of medical removal protection benefits upon the employee's participation in medical surveillance provided in accordance with this section.
- (13) Multiple physician review.
 - (i) If the employer selects the initial physician to conduct any medical examination or consultation provided to an employee under this section, the employee may designate a second physician to:
 - (A) Review any findings, determinations, or recommendations of the initial physician; and
 - (B) Conduct such examinations, consultations, and laboratory tests as the second physician deems necessary to facilitate this review.
 - (ii) The employer shall promptly notify an employee of the right to seek a second medical opinion after each occasion that an initial physician provided by the employer conducts a medical examination or consultation pursuant to this section. The employer may condition its participation in, and payment for, multiple physician review upon the employee doing the following within fifteen (15) days after receipt of this notice, or receipt of the initial physician's written opinion, whichever is later:
 - (A) Informing the employer that he or she intends to seek a medical opinion; and
 - (B) Initiating steps to make an appointment with a second physician.
 - (iii) If the findings, determinations, or recommendations of the second physician differ from those of the initial physician, then the employer and the employee shall assure that efforts are made for the two physicians to resolve any disagreement.
 - (iv) If the two physicians have been unable to quickly resolve their disagreement, then the employer and the employee, through their respective physicians, shall designate a third physician to:
 - (A) Review any findings, determinations, or recommendations of the other two physicians; and
 - (B) Conduct such examinations, consultations, laboratory tests, and discussions with the other two physicians as the third physician deems necessary to resolve the disagreement among them.
 - (v) The employer shall act consistently with the findings, determinations, and recommendations of the third physician, unless the employer and the employee reach an agreement that is consistent with the recommendations of at least one of the other two physicians.
- (14) Alternate physician determination. The employer and an employee or designated employee representative may agree upon the use of any alternate form of physician determination in lieu of the multiple physician review provided by paragraph (l)(13) of this section, so long as the alternative is expeditious and at least as protective of the employee.
- (15) Information the employer must provide the employee.
 - (i) The employer shall provide a copy of the physician's written medical opinion to the examined employee within five working days after receipt thereof.

- (ii) The employer shall provide the employee with a copy of the employee's biological monitoring results and an explanation sheet explaining the results within five working days after receipt thereof.
- (iii) Within 30 days after a request by an employee, the employer shall provide the employee with the information the employer is required to provide the examining physician under paragraph (l)(9) of this section.
- (16) Reporting. In addition to other medical events that are required to be reported on the OSHA Form No. 200, the employer shall report any abnormal condition or disorder caused by occupational exposure to cadmium associated with employment as specified in Chapter (V)(E) of the Reporting Guidelines for Occupational Injuries and Illnesses.
- (m) Communication of cadmium hazards to employees.
 - (1) General. In communications concerning cadmium hazards, employers shall comply with the requirements of OSHA's Hazard Communication Standard for the construction industry, 29 CFR 1926.59, including but not limited to the requirements concerning warning signs and labels, material safety data sheets (MSDS), and employee information and training. In addition, employers shall comply with the following requirements:
 - (2) Warning signs.
 - (i) Warning signs shall be provided and displayed in regulated areas. In addition, warning signs shall be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.
 - (ii) Warning signs required by paragraph (m)(2)(i) of this section shall bear the following information:

DANGER, CADMIUM, CANCER HAZARD, CAN CAUSE LUNG AND KIDNEY DISEASE, AUTHORIZED PERSONNEL ONLY, RESPIRATORS REQUIRED IN THIS AREA
 - (iii) The employer shall assure that signs required by this paragraph are illuminated, cleaned, and maintained as necessary so that the legend is readily visible.
 - (3) Warning labels.
 - (i) Shipping and storage containers containing cadmium, cadmium compounds, or cadmium contaminated clothing, equipment, waste, scrap, or debris shall bear appropriate warning labels, as specified in paragraph (m)(3)(ii) of this section.
 - (ii) The warning labels shall include at least the following information:

Danger, Contains Cadmium, Cancer Hazard, Avoid Creating Dust, Can Cause Lung and Kidney Disease
 - (iii) Where feasible, installed cadmium products shall have a visible label or other indication that cadmium is present.
 - (4) Employee information and training.
 - (i) The employer shall institute a training program for all employees who are potentially exposed to cadmium, assure employee participation in the program, and maintain a record of the contents of such program.
 - (ii) Training shall be provided prior to or at the time of initial assignment to a job involving potential exposure to cadmium and at least annually thereafter.
 - (iii) The employer shall make the training program understandable to the employee and shall assure that each employee is informed of the following:
 - (A) The health hazards associated with cadmium exposure, with special attention to the information incorporated in appendix A to this section;
 - (B) The quantity, location, manner of use, release, and storage of cadmium in the workplace and the specific nature of operations that could result in exposure to cadmium, especially exposures above the PEL;
 - (C) The engineering controls and work practices associated with the employee's job assignment;
 - (D) The measures employees can take to protect themselves from exposure to cadmium, including modification of such habits as smoking and personal hygiene, and specific procedures the employer has implemented to protect employees from exposure to cadmium such as appropriate work practices, emergency procedures, and the provision of personal protective equipment;
 - (E) The purpose, proper selection, fitting, proper use, and limitations of respirators and protective clothing;

- (F) The purpose and a description of the medical surveillance program required by paragraph (l) of this section;
 - (G) The contents of this section and its appendices, and,
 - (H) The employee's rights of access to records under §1926.33(g)(1) and (2).
 - (iv) Additional access to information and training program and materials.
 - (A) The employer shall make a copy of this section and its appendices readily available to all affected employees and shall provide a copy without cost if requested.
 - (B) Upon request, the employer shall provide to the Assistant Secretary or the Director all materials relating to the employee information and the training program.
- (5) Multi-employer workplace. In a multi-employer workplace, an employer who produces, uses, or stores cadmium in a manner that may expose employees of other employers to cadmium shall notify those employers of the potential hazard in accordance with paragraph (e) of the hazard communication standard for construction, 29 CFR 1926.59.
- (n) Record keeping.
 - (1) Exposure monitoring.
 - (i) The employer shall establish and keep an accurate record of all air monitoring for cadmium in the workplace.
 - (ii) This record shall include at least the following information:
 - (A) The monitoring date, shift, duration, air volume, and results in terms of an 8-hour TWA of each sample taken, and if cadmium is not detected, the detection level;
 - (B) The name, social security number, and job classification of all employees monitored and of all other employees whose exposures the monitoring result is intended to represent, including, where applicable, a description of how it was determined that the employee's monitoring result could be taken to represent other employee's exposures;
 - (C) A description of the sampling and analytical methods used and evidence of their accuracy;
 - (D) The type of respiratory protective device, if any, worn by the monitored employee and by any other employee whose exposure the monitoring results is intended to represent;
 - (E) A notation of any other conditions that might have affected the monitoring results.
 - (F) Any exposure monitoring or objective data that were used and the levels.
 - (iii) The employer shall maintain this record for at least thirty (30) years, in accordance with §1926.33 of this part.
 - (iv) The employer shall also provide a copy of the results of an employee's air monitoring prescribed in paragraph (d) of this section to an industry trade association and to the employee's union, if any, or, if either of such associations or unions do not exist, to another comparable organization that is competent to maintain such records and is reasonably accessible to employers and employees in the industry.
 - (2) Objective data for exemption from requirement for initial monitoring.
 - (i) For purposes of this section, objective data are information demonstrating that a particular product or material containing cadmium or a specific process, operation, or activity involving cadmium cannot release dust or fumes in concentrations at or above the action level even under the worst case release conditions. Objective data can be obtained from an industry wide study or from laboratory product test results from manufacturers of cadmium containing products or materials. The data the employer uses from an industry wide survey must be obtained under workplace conditions closely resembling the processes, types of material, control methods, work practices and environmental conditions in the employer's current operations.
 - (ii) The employer shall maintain the record for at least 30 years of the objective data relied upon.
 - (3) Medical surveillance.
 - (i) The employer shall establish and maintain an accurate record for each employee covered by medical surveillance under paragraph (l)(1)(i) of this section.

- (ii) The record shall include at least the following information about the employee:
 - (A) Name, social security number, and description of duties;
 - (B) A copy of the physician's written opinions and of the explanation sheets for biological monitoring results;
 - (C) A copy of the medical history, and the results of any physical examination and all test results that are required to be provided by this section, including biological tests, X-rays, pulmonary function tests, etc., or that have been obtained to further evaluate any condition that might be related to cadmium exposure;
 - (D) The employee's medical symptoms that might be related to exposure to cadmium; and
 - (E) A copy of the information provided to the physician as required by paragraph (l)(9) of this section.
- (iii) The employer shall assure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with §1926.33 of this part.
- (iv) At the employee's request, the employer shall promptly provide a copy of the employee's medical record, or update as appropriate, to a medical doctor or a union specified by the employee.
- (4) Training. The employer shall certify that employees have been trained by preparing a certification record that includes the identity of the person trained, the signature of the employer or the person who conducted the training, and the date the training was completed. The certification records shall be prepared at the completion of training and shall be maintained on file for one (1) year beyond the date of training of that employee.
- (5) Availability.
 - (i) Except as otherwise provided for in this section, access to all records required to be maintained by paragraphs (n)(1)-(4) of this section shall be in accordance with the provisions of §1926.33 of this part.
 - (ii) Within 15 days after a request, the employer shall make an employee's medical records required to be kept by paragraph (n)(3) of this section available for examination and copying to the subject employee, to designated representatives, to anyone having the specific written consent of the subject employee, and after the employee's death or incapacitation, to the employee's family members.
- (6) Transfer of records. Whenever an employer ceases to do business and there is no successor employer or designated organization to receive and retain records for the prescribed period, the employer shall comply with the requirements concerning transfer of records set forth in §1926.33(h) of this part.
- (o) Observation of monitoring.
 - (1) Employee observation. The employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to cadmium.
 - (2) Observation procedures. When observation of monitoring requires entry into an area where the use of protective clothing or equipment is required, the employer shall provide the observer with that clothing and equipment and shall assure that the observer uses such clothing and equipment and complies with all other applicable safety and health procedures.
- (p) Dates.
 - (1) Effective date. This section shall become effective on December 14, 1992.
 - (2) Startup dates. All obligations of this section commence on the effective date except as follows:
 - (i) Exposure monitoring. Except for small businesses (nineteen (19) or fewer employees), initial monitoring required by paragraph (d)(2) of this section shall be completed as soon as possible and in any event no later than 60 days after the effective date of this standard. For small businesses, initial monitoring required by paragraph (d)(2) of this section shall be completed as soon as possible and in any event no later than 120 days after the effective date of this standard.
 - (ii) The permissible exposure limit (PEL). Except for small businesses, as defined under paragraph (p)(2)(i) of this section, the employer shall comply with the PEL established by paragraph (c) of this section as soon as possible and in any event no later than 90 days after the effective date of this section. For small businesses, the employer shall comply with the PEL established by paragraph (c) of this section as

soon as possible and in any event no later than 150 days after the effective date of this section.

- (iii) Regulated areas. Except for small businesses, as defined under paragraph (p)(2)(i) of this section, regulated areas required to be established by paragraph (e) of this section shall be set up as soon as possible after the results of exposure monitoring are known and in any event no later than 90 days after the effective date of this section. For small businesses, regulated areas required to be established by paragraph (e) of this section shall be set up as soon as possible after the results of exposure monitoring are known and in any event no later than 150 days after the effective date of this section.
- (iv) Respiratory protection. Except for small businesses, as defined under paragraph (p)(2)(i) of this section, respiratory protection required by paragraph (g) of this section shall be provided as soon as possible and in any event no later than 90 days after the effective date of this section. For small businesses, respiratory protection required by paragraph (g) of this section shall be provided as soon as possible and in any event no later than 150 days after the effective date of this section.
- (v) Compliance program. Except for small businesses, as defined under paragraph (p)(2)(i) of this section, written compliance programs required by paragraph (f)(2) of this section shall be completed and available as soon as possible and in any event no later than 90 days after the effective date of this section. For small businesses, written compliance programs required by paragraph (f)(2) of this section shall be completed and available as soon as possible and in any event no later than 180 days after the effective date of this section.
- (vi) Methods of compliance. Except for small businesses, as defined under paragraph (p)(2)(i) of this section, the engineering controls required by paragraph (f)(1) of this section shall be implemented as soon as possible and in any event no later than 120 days after the effective date of this section. For small businesses, the engineering controls required by paragraph (f)(1) of this section shall be implemented as soon as possible and in any event no later than 240 days after the effective date of this section. Work practice controls shall be implemented as soon as possible. Work practice controls that are directly related to engineering controls to be implemented shall be implemented as soon as possible after such engineering controls are implemented.
- (vii) Hygiene and lunchroom facilities. Except for small businesses, as defined under paragraph (p)(2)(i) of this section, hand washing facilities, showers, change rooms and eating facilities required by paragraph (j) of this section, whether permanent or temporary, shall be provided as soon as possible and in any event no later than 60 days after the effective date of this section. For small businesses, hand washing facilities, showers, change rooms and eating facilities required by paragraph (j) of this section, whether permanent or temporary, shall be provided as soon as possible and in any event no later than 120 days after the effective date of this section.
- (viii) Employee information and training. Except for small businesses, as defined under paragraph (p)(2)(i) of this section, employee information and training required by paragraph (m)(4) of this section shall be provided as soon as possible and in any event no later than 90 days after the effective date of this standard. For small businesses, employee information and training required by paragraph (m)(4) of this section shall be provided as soon as possible and in any event no later than 180 days after the effective date of this standard.
- (ix) Medical surveillance. Except for small businesses, as defined under paragraph (p)(2)(i) of this section, initial medical examinations required by paragraph (l) of this section shall be provided as soon as possible and in any event no later than 90 days after the effective date of this standard. For small businesses, initial medical examinations required by paragraph (l) of this section shall be provided as soon as possible and in any event no later than 180 days after the effective date of this standard.

(q) Appendices.

- (1) Appendix C to this section is incorporated as part of this section, and compliance with its contents is mandatory.
- (2) Except where portions of appendices A, B, D, E, and F to this section are expressly incorporated in requirements of this section, these appendices are purely informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

Appendix A to §1926.1127-Substance Safety Data Sheet

Note: The requirements applicable to construction work under this Appendix A are identical to those set forth in Appendix A to §1910.1027 of this chapter.

Appendix B to §1926.1127-Substance Technical Guidelines for Cadmium

Note: The requirements applicable to construction work under this Appendix B are identical to those set forth in Appendix B to §1910.1027 of this chapter.

Appendix C to §1910.1127 [Removed and Reserved]

Appendix D to §1926.1127-Occupational Health History Interview With Reference to Cadmium Exposure

Note: The requirements applicable to construction work under this Appendix D are identical to those set forth in Appendix D to §1910.1027 of this chapter.

Appendix E to §1926.1127-Cadmium in Workplace Atmospheres

Note: The requirements applicable to construction work under this Appendix E are identical to those set forth in Appendix E to §1910.1027 of this chapter.

Appendix F to §1926.1127-Nonmandatory Protocol for Biological Monitoring

Note: The requirements applicable to construction work under this Appendix F are identical to those set forth in Appendix F to §1910.1027 of this chapter.

§12-147-2 Definitions. As used in 29 CFR 1926.1127 and applied to this chapter:

"Assistant Secretary" means the director of the department of labor and industrial relations or the director's designee.

"Effective date" means March 14, 1993.

"OSH Act" means chapter 396, Hawaii Revised Statutes.

"OSHA" means the occupational safety and health division, State of Hawaii.

"§1910.1027 of this chapter" means section 12-202-39.

"Startup dates" means six months following the dates listed in this paragraph.

"29 CFR 1926.33" means section 12-202-3.

"29 CFR 1910.133" means section 1910.133 in chapter 12-64.1.

"29 CFR 1910.134" means section 1910.134 in chapter 12-64.1.

"29 CFR 1926.32(f)" means section 12-50-2.

"29 CFR 1926.51" means chapter 12-117.1.

"29 CFR 1926.59" means chapter 12-203.1.

"29 CFR 1926.353" means section 12-126-7.

"29 CFR 1926.354" means section 12-126-5. [Eff 2/26/93; am 7/25/94;

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am 8/10/95; am 11/16/96; am 2/8/97] (Auth: HRS §396-4) (Imp: HRS §396-4)